

case, a chart of which is given above. The patient was suffering from pneumonia and delirium tremens, but was quiet for some hours at the time of the experiment.

The summary of our results in the cold-air treatment of various infections shows that of 16 experiments carried out on 12 patients but 2 were positive, judging from the time of onset and degree of the rise in blood pressure. The heart was slowed in 4 of the experiments, in which the patient was covered with only a sheet. No sweeping conclusions can be drawn from an experience with so few cases, but the generally negative results make it seem improbable that the therapeutic value of cold air in diseases of adults is due to any dynamic effect on the circulation. That cold fresh air is of the utmost value in the treatment of infectious diseases is unquestionable, but its *modus operandi* must be sought in other directions.

CONCLUSIONS. 1. A slight rise of systolic blood pressure is produced in normal adults by exposure of the face to cold air. This rise persists for a varying length of time, and is often succeeded by a fall to the initial level, although the exposure be continued.

2. In 16 experiments carried out on 12 adults suffering from different infections the systolic blood pressure was increased decidedly but twice, as a result of exposing the patients to cold air.

## LEUKOCYTE AND DIFFERENTIAL COUNTS IN WARD AND OPEN AIR TREATMENT.

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FEW observations have been made comparing the leukocyte counts of patients in the usual hospital ward with counts made in the open air. Cabot<sup>1</sup> states that prolonged cold bathing decreases the number of white cells in the peripheral circulation and dry cold does the same. Lenkei<sup>2</sup> found that cold-air baths caused a rise in leukocytes in a majority of cases, amounting to as much as 9.8 per cent. Van Oordt<sup>3</sup> has carried out some very complete experiments along this line. He exposed naked persons to an average temperature of 7° C., making leukocyte counts immediately before and at varying lengths of time after exposure. His conclusions were that cold air causes a leukocytosis in the skin capillaries which is produced by thermotaxis, and that this leukocytosis continues as long as the naked body is exposed to the cold air. Upon rewarming the

<sup>1</sup> Clinical Examination of the Blood, p. 189.

<sup>2</sup> Fester Med. Chir. Presse, May, 1910, xlv, No. 20.

<sup>3</sup> Zeit. f. Diätetische u. physikal. Therapie, 1905-6, ix, 335.

skin there is a gradual decrease in the leukocytes until the end of an hour, when the change ceases, leaving, however, an absolute increase in the number of leukocytes.

Our object was not to determine if there was any transient change in the leukocyte or differential counts when patients were moved into the open air, but to learn if there was any constant difference between the counts in the ward and those out-of-doors in the regular routine treatment of bed patients.

We have made total leukocyte and differential counts upon patients at times varying from one hour to three or four days after moving the patients from the ward into the open air, or from open air into ward. The time allowed to elapse between the counts depended upon the nature of the case. In cases that were apt to have marked changes in the number of white cells, the counts were made with only a few hours intervening, and those in which there was little change clinically, counts were made at longer intervals. In the open air only the face of the patient was exposed. All but 3 of our patients were kept constantly in bed during the experiments. To avoid digestion leukocytosis nearly all of the counts were made from three to five hours after a meal. Digestion leukocytosis, however, is hardly to be considered in the febrile cases, because of their comparatively low proteid diet. In the latter cases the counts were made at the height of the disease, and crises or sudden changes in the intensity of the infections were avoided.

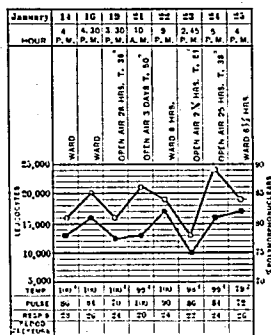


FIG. 1.—Leukocyte chart of febrile case.

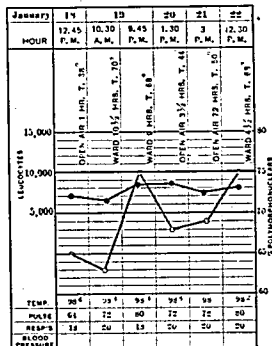


FIG. 2.—Leukocyte chart of afebrile case.

In making the differential counts, attention was given only to the percentage of polymorphonuclears, they being the cells of chief interest in a majority of acute infections.

The method of charting the counts is shown in the accompanying leukocyte chart (Figs. 1 and 2). This chart was suggested to us by the charts used by Gibson<sup>1</sup> and Hewitt<sup>2</sup> in their papers on the leukocyte and differential counts in acute surgical diseases. Ten thousand leukocytes and 75 per cent. polymorphonuclears are considered the upper limits of normal, and are placed on the same normal line in the chart.

Observations were made upon 10 afebrile and 8 febrile patients. The accompanying table shows the results obtained.

| Disease.                                     | Ward.                        |                                 |                   |                           | Open air.                   |                           |                                           |                                                         |
|----------------------------------------------|------------------------------|---------------------------------|-------------------|---------------------------|-----------------------------|---------------------------|-------------------------------------------|---------------------------------------------------------|
|                                              | Average temperature of ward. | Average temperature of patient. | Number of counts. | Average total leukocytes. | Average temperature of air. | Average total leukocytes. | Average percentage of polymorphonuclears. | Percentage of increase or decrease of total leukocytes. |
| <b>AFEBRILE PATIENTS.</b>                    |                              |                                 |                   |                           |                             |                           |                                           |                                                         |
| Tenotomy (postoperative) . . . . .           | 68°                          | 95.2                            | 3                 | 8,500 49.3                | 23°                         | 3                         | 9,166 48.6                                | + 7.8 —1.4                                              |
| Entamebic dysentery (convalescent) . . . . . | 68°                          | 98.4                            | 3                 | 8,166 71.3                | 32°                         | 3                         | 6,750 75.0                                | + 17.3 + 5.3                                            |
| Syphilis of liver . . . . .                  | 68°                          | 98.5                            | 3                 | 9,377 82.2                | 36°                         | 3                         | 9,333 84.3                                | + 0.4 + 1.2                                             |
| Chronic cardiac valvular disease . . . . .   | 68°                          | 98.5                            | 3                 | 6,750 54.3                | 34°                         | 3                         | 7,166 68.6                                | + 9.1 + 7.5                                             |
| Pharyngitis (convalescent) . . . . .         | 68°                          | 98.6                            | 3                 | 9,000 63.0                | 47°                         | 3                         | 9,250 61.5                                | + 2.8 — 2.4                                             |
| Constipation . . . . .                       | 68°                          | 98.6                            | 3                 | 7,500 71.0                | 41°                         | 3                         | 7,666 67.3                                | + 2.2 — 5.4                                             |
| Hernia (postoperative) . . . . .             | 68°                          | 98.6                            | 3                 | 8,750 60.0                | 40°                         | 3                         | 9,000 57.5                                | + 2.8 — 4.1                                             |
| Hernia (postoperative) . . . . .             | 68°                          | 98.6                            | 3                 | 12,166 68.6               | 32°                         | 3                         | 6,000 72.0                                | + 14.2 + 1.4                                            |
| Malaria (convalescent) . . . . .             | 68°                          | 99.0                            | 3                 | 9,000 50.5                | 52°                         | 3                         | 11,666 68.6                               | + 4.1 — 6.9                                             |
| <b>FEBRILE PATIENTS.</b>                     |                              |                                 |                   |                           |                             |                           |                                           |                                                         |
| Lobar pneumonia . . . . .                    | 68°                          | 104.1                           | 3                 | 11,333 93.6               | 37°                         | 3                         | 11,533 94.6                               | + 4.4 + 1.0                                             |
| Lobar pneumonia . . . . .                    | 68°                          | 102.3                           | 3                 | 10,500 89.5               | 38°                         | 3                         | 10,375 89.5                               | + 1.2 — 1.2                                             |
| Lobar pneumonia . . . . .                    | 68°                          | 103.1                           | 3                 | 27,500 90.0               | 39°                         | 3                         | 27,166 89.6                               | + 3.2 — 0.4                                             |
| Lobar pneumonia . . . . .                    | 68°                          | 103.5                           | 3                 | 16,250 89.5               | 24°                         | 3                         | 14,833 90.6                               | + 9.1 + 1.2                                             |
| Serofibrinous pleurisy . . . . .             | 68°                          | 100.5                           | 3                 | 8,333 77.3                | 33°                         | 3                         | 7,500 74.5                                | + 9.9 — 0.6                                             |
| Chronic pulmonary tuberculosis . . . . .     | 68°                          | 102.2                           | 3                 | 8,600 78.5                | 23°                         | 3                         | 8,200 75.0                                | + 4.0 — 4.1                                             |
| Chronic bronchitis . . . . .                 | 68°                          | 100.0                           | 4                 | 15,377 83.5               | 21°                         | 3                         | 12,777 83.5                               | + 16.8 — 16.8                                           |
| Acute bronchitis . . . . .                   | 68°                          | 101.5                           | 3                 | 10,166 84.0               | 19°                         | 3                         | 10,533 87.0                               | + 3.4 + 3.5                                             |

Of the afebrile patients, there were 5 who showed an increase and 5 a decrease in total leukocytes, 4 an increase, 1 no change, and 5 a decrease in the polymorphonuclear counts. The total leukocytes of 2 of the 8 patients with fever were increased and 6 decreased in the open air. The polymorphonuclear percentages were increased in 3 cases, they were unchanged in 2 and decreased in 3 cases.

CONCLUSIONS. 1. There is no constant change in the total leukocyte or polymorphonuclear counts in afebrile patients when

<sup>1</sup> Annals of Surgery, April 1906, xlv, 485.

<sup>2</sup> Ibid., December 1911, liv, 721.

treated in the open air with only the face exposed as compared with counts in the ward.

2. In the majority of patients with fever and leukocytosis there is a small percentage decrease in the total leukocytes when treated in the open air with only the face exposed as compared with the count when treated in the ward. Under like conditions there is no constant change in the polymorphonuclear counts.

These experiments were carried out at the House of Relief in the service of Dr. T. B. Barringer, to whom I am much indebted for advice and assistance in the preparation of this paper.

### FATAL PNEUMOTHORAX FOLLOWING EXPLORATORY PUNCTURE.<sup>1</sup>

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In a paper on Accidents and Deaths from Exploratory Puncture of the Pleura,<sup>2</sup> the statement was made that the importance of pneumothorax after exploratory puncture depended upon the condition of the patient at the time of its occurrence and upon the physical state of the perforated lung, which might permit contraction of the puncture or favor extreme or progressive pneumothorax. This was based entirely upon a study of cases in the literature as no instances of this accident were found in the records of the New York Hospital during the twelve and a half years under consideration. Since then 2 fatal cases of this character have forced the conclusion that the physical state of the opposite lung may be of even greater importance.

Case No. 175,676, a widow, aged fifty-eight years, was admitted to New York Hospital on February 7, 1912, complaining of pain in the chest and cough. The only significant portion of her previous history was that of chronic cough for many years. In February, 1911, she was treated in the New York Hospital for an attack which was diagnosed as pneumonia and resembled it in history, blood findings, and course, though the sputum was never blood-tinged. Cough continued until the present illness. About December 29, 1911, she had cough, chills, and fever every night, moderate sputum, never blood-tinged, and pain in both chests increased by coughing. Since January 4 she had been confined to bed and had lost considerable weight. On February 7, examination showed emaciation. Over both lungs there were slightly woody resonance, high-pitched

<sup>1</sup> Read before the New York Academy of Medicine, Section on Medicine, May 21, 1912

<sup>2</sup> Surg., Gyn., and Obstet., 1911, xiii, 607.